Rev Bras Neurol. 51 (3):62-8, 2015

Insomnia current diagnosis: an appraisal

Diagnóstico atual de insônia: uma apreciação

Philippe Joaquim Oliveira Menezes Macêdo[1], Gisele Schenkel de Moura Leite Neves[1], Dalva Lucia Rollemberg Poyares[2], Marleide da Mota Gomes[1]

ABSTRACT

Chronic insomnia is the most common sleep disorder in adults and its diagnosis is fundamental for adequate clinical management. The aim of this paper is to present recently published definitions of insomnia according to current international classifications, such as the International Classification of Sleep Disorders – Third Edition and the Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition. For the first time, these classifications are congruent related to their diagnostic criteria; both present insomnia as a distinct disorder and divide it into acute, chronic and other. This emphasizes the necessity of a specific insomnia approach. Furthermore, it is necessary to recognize those insomniacs with physiological hyperarousal, which may be identified by objective measures (short total sleep time, for instance). These patients may have poorer outcome, as they are at higher risk of developing cardiometabolic conditions and neurocognitive impairment. Diagnosis is primarily made on a clinical basis (anamnesis and physical examination), while sleep diaries and questionnaires (such as Insomnia Severity Index) can help evaluate these patients. Objective measures, such as polysomnography, are not required in most cases, except when suspicion of another sleep disorder arises.

Keywords: Insomnia, comorbid insomnia, short sleep duration.

RESUMO

A insônia crônica é o transtorno do sono mais comum em adultos, e seu diagnóstico é fundamental para o manejo clínico adequado. O principal objetivo deste trabalho é apresentar, em relação à insônia, as definições publicadas recentemente segundo as novas classificações internacionais, como a Classificação Internacional de Distúrbios do Sono – Terceira Edição e o Manual Diagnóstico e Estatístico de Transtornos Mentais – Quinta Edição. Pela primeira vez, essas classificações são congruentes a respeito de seus critérios diagnósticos, pois ambas apresentam a insônia como uma doença em si e a dividem em aguda, crônica e outras. Isso enfatiza a necessidade de uma abordagem específica da insônia. Além do mais, é necessário reconhecer os insones com estado fisiológico de hiperalerta que podem ser identificados por medidas objetivas (tempo total de sono curto, por exemplo). Esses pacientes podem ter pior prognóstico, por causa do maior risco de desenvolver condições cardiometabólicas e comprometimento neurocognitivo. O diagnóstico da insônia é feito principalmente com base em dados clínicos (anamnese e exame físico), e o uso de diário de sono e questionários (tais como o Índice de Gravidade de Insônia) pode ajudar na avaliação desses pacientes. Análises objetivas, como aquelas obtidas pela polissonografia, não são rotineiramente necessárias na maioria dos casos, exceto quando há a suspeita de outro distúrbio do sono.

Palavras-chave: Insônia, insônia comórbida, sono de duração curta.

[1] Universidade Federal do Rio de Janeiro (UFRJ), Rio de Janeiro, RJ, Brazil.
[2] Universidade Federal de São Paulo (Unifesp), São Paulo, SP, Brazil.

Address for correspondence: Dra. Gisele Schenkel de Moura Leite Neves. Programa de Epilepsia do Instituto de Neurologia Deolindo Couto da Universidade Federal do Rio de Janeiro (UFRJ). Av. Venceslau Braz, 95, Botafogo – 22290-140 – Rio de Janeiro, RJ, Brazil. E-mail: gsmlneves@gmail.com.br

INTRODUCTION

The adverse consequences of sleep disruption on human physiology are well known as they compromise the individual's health and well-being. Short sleep has been linked to obesity, hypertension, altered metabolic/endocrine profile (such as diabetes), coronary heart disease and increased mortality risk.[1] Furthermore, many studies demonstrate an association between untreated or underlying sleep disorder with daytime dysfunction, cognitive impairment, metabolic disorders, stroke, sudden death during sleep and higher risk of fatal and nonfatal cardiovascular diseases.[2-8] Insomnia is the most prevalent sleep disorder in the general population.[9] It is currently defined, according to the International Classification of Sleep Disorders – Third Edition (ICSD-3) criteria, as persistent difficulty with sleep initiation, duration, consolidation or quality that occurs despite the opportunity and circumstances for sleep, which results in some type of disability during the day.[10] Despite the relevance of insomnia in clinical practice, it is undervalued by most health professionals and patients. Additionally, due to the wide variety of definitions used in scientific papers, it is difficult to compare outcomes and risk factors in a meaningful way.[11] Nevertheless, as a symptom, syndrome or disease, it has a significant negative impact on social life, task performance and daytime functioning with higher odds of errors or accidents.[12,13] Therefore, the objective of this paper is to appraise the most recent international insomnia classifications and raise some issues regarding insomnia diagnosis.

PREVALENCE OF INSOMNIA COMPLAINTS, SYMPTOMS, SYNDROME AND DISORDER

Ohayon and Reynolds[12] assessed the prevalence of insomnia according to various definitions in a European population aged 15-years or older. They found that one-third (34.5%) of individuals had at least one symptom of insomnia: 23.1% experienced difficulty maintaining sleep (the most common symptom), whilst 10.9%, 12.3% and 11.1% experienced difficulty initiating sleep, early morning awakening and non-restorative sleep, respectively. When applying DSM-IV criteria, 9.8% were found to have insomnia disorder, and after exclusion of other clinical and psychiatric conditions, 3% were diagnosed with primary insomnia.[12] In a study evaluating 1,042 subjects in Brazil, 15% were found to have insomnia based on DSM-IV criteria, while 32% were found to experience insomnia using objective measures.[14] Objective insomnia was defined as meeting one of the following criteria: sleep onset latency > 30 minutes (sleep initiating insomnia), wake after sleep onset lasting > 30 minutes (sleep maintenance insomnia), total sleep time < 360 minutes and a terminal wakefulness > 30 minutes (insomnia with too short duration of sleep or early morning awakening), or a combination of the previous quantitative criteria (mixed disorder).

CORRELATES OF INSOMNIA, COSTS AND QUALITY OF LIFE

The isolated occurrence of insomnia disorder in the general population is an uncommon event. It is typically followed by multiple, recurrent and persistent health problems, which increase demand for health care and raise direct and indirect costs related to insomnia management.[3,4,11,15] Considering the high prevalence of this sleep disturbance and its burden on public health, the consequences of untreated disease for both the individual and society can be disastrous. Untreated disease can lead to increased work absenteeism related to all causes of illness (clinical and psychiatric), lower task performance and higher odds of accidents.[4,5,16] The risk of non-intentional fatal injuries increases in individuals who experience difficulty falling asleep, maintaining sleep or non-restorative sleep, and also increases when there is an association of two or more of these symptoms.[17]

According to social and demographic data, insomnia is usually more common in women than men, with a woman/man ratio of 1.4 for insomnia symptoms (1.7 after 45 years of age), and of 2.0 for insomnia diagnosis.[6,11] Old individuals have also higher odds of developing insomnia,[18] as well as those with impaired marital status (widow, divorced, separated), unemployed or retired.[11] When considering only newly diagnosed patients, Singareddy *et al.*[6] found that the incidence of insomnia was higher in younger individuals. Quality of life of insomniacs is significantly impaired, affecting their overall subjective sense of physical well-being. This is probably secondary to psychiatric or physical disorders, medications and psychosocial issues, with some studies showing a positive effect of insomnia treatment and management of comorbidities on quality of life.[19]

Insomnia disorder and insomnia symptoms are commonly related to neuropsychiatric illness, especially mood disorders.[11] The majority of subjects with major depression (80%) develop insomnia symptoms in the course of their disease, exhibiting a four-fold risk when compared with the general population.[11,12] Anxiety disorder is also more common in insomniacs, while insomnia can facilitate or trigger anxiety and depressive disorder.[11,12] Smoking positively correlates with difficulty in achieving sleep initiation and maintenance and may lead to short sleep duration (< 6 hours).[11] Alcohol consumption may at first accelerate sleep onset, but chronic use will likely increase sleep disruption and abolish its effect on sleep initiation.[11]

It is possible to define two subgroups of insomnia patients with the presence or absence of physiological hyperarousal, which can be identified by objective measures, as short sleep duration and mean latency > 8 minutes on Multiple Latency Sleep Test (MLST).[7,8] Patients with hyperarousal/hyperalert state express a higher risk of cardiometabolic conditions, such as hypertension, impaired heart rate variability and pre-ejection period and type 2 diabetes – all of which increase mortality in these individuals.[1,7] Furthermore, these patients are more likely to develop neurocognitive impairment, poorer psychiatric comorbidity and a more severe phenotype of insomnia.[7] While evaluating the performance of insomniacs and normal sleepers using computer-administered reaction time tasks, Edinger *et al.*[8] demonstrated that those with insomnia and physiological hyperarousal (defined by mean latency on MLST > 8 minutes) had lower performance on tasks requiring attention. This was evidenced by higher error rate, showing cognitive deficit.[8]

CURRENT CLASSIFICATIONS

International Classification of Sleep Disorders – Third Edition (ICSD-3, tables 1 and 2)[10]

The last update of the ICSD occurred in 2014 and its content revisions were in line with the DSM-V. One of the major changes includes a single entry for the disorders of insomnia called "insomnia disorder". Compared to ICSD-2, ICSD-3 has a less extensive diagnostic subtyping, which applies to patients with and without comorbidities, regardless of the disruptive potential of the comorbidities. Among adults with insomnia, sleep complaints typically include more difficulty in initiating or maintaining sleep. Concerns over long periods of nocturnal wakefulness, insufficient amounts of night-time sleep or poor quality of sleep often accompany these complaints. In children, this sleep disorder is frequently reported by caregivers and characterized by resistance to sleep, frequent nocturnal awakenings, and/or an inability to sleep independently.

Daytime consequences are reported by these subjects, presumably caused by reduced nocturnal sleep or by some other common mechanism. Daytime symptoms often include fatigue, decreased mood or irritability, malaise and cognitive impairment. Among adults, chronic insomnia can impair social or occupational functioning and reduce quality of life. In children, it can lead to poor school performance, impaired attention and behavior disorders. It is not unusual for some patients to experience physical symptoms such as muscle tension, palpitations and headache. Despite daytime impairment, these patients usually don't complain of excessive somnolence or report a high occurrence of naps.

ICSD-3 includes three diagnostic categories for insomnia: chronic insomnia disorder (Table 1), disorder of short-term insomnia (Table 2) and another insomnia disorder. Chronic insomnia disorder is characterized by difficulty falling asleep and/or complaints of sleep maintenance associated with daytime impairment for at least three months. It is reserved for individuals whose sleep difficulties exceed frequency limits (at least three times per week) and minimum length to be associated with clinically significant morbidity. Of note, former chronic primary insomnia criteria (DSM IV) included symptoms occurring for at least one month. Short-term insomnia has a similar definition and is applied when the complaints or symptoms last less than three months; when neither criterion is fulfilled, a definition of other insomnia disorder is used.

Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (DSM-V, table 3)[20,21]

DSM-V was launched in 2013 and is much like ICSD-3. Compared with DSM-IV-TR, DSM-V

mandates concurrent specification of coexisting conditions and acknowledges the bidirectional and interactive effects between sleep disorder and coexisting medical and mental disorders. This is a paradigm shift widely accepted in the field of sleep medicine, moving away from causal attributions between coexisting disturbances. The diagnosis of primary insomnia disorder was replaced for insomnia disorder (Table 3), avoiding the differentiation between primary and secondary insomnia.

Table 1. Chronic insomnia disorder (ICSD-3)

Diagnostic Criteria
Criteria A-F must be met
A. The patient reports, or the patient's parent or caregiver observes, one or more of the following:
1. Difficulty initiating sleep.
2. Difficulty maintaining sleep.
3. Waking up earlier than desired.
4. Resistance to going to bed on appropriate schedule.
5. Difficulty sleeping without parent or caregiver intervention.
B. The patient reports, or the patient's parent or caregiver observes, one or more of the following related to the night-time sleep difficulty:
1. Fatigue/malaise.
2. Attention, concentration or memory impairment.
3. Impaired social, family, occupational or academic performance.
4. Mood disturbance/irritability.
5. Daytime sleepiness.
6. Behavioral problems (*e.g.*, hyperactivity, impulsivity, aggression).
7. Reduced motivation/energy/initiative.
8. Proneness for errors/accidents.
9. Concerns about or dissatisfaction with sleep.
C. The reported sleep/wake complaints cannot be explained purely by inadequate opportunity (i.e., enough time is allotted for sleep) or inadequate circumstances (i.e., the environment is safe, dark, quiet and comfortable) for sleep.
D. The sleep disturbance and associated daytime symptoms occur at least three times per week.
E. The sleep disturbance and associated daytime symptoms have been present for at least three months.
F. The sleep/wake difficulty is not better explained by another sleep disorder.

Table 2. Short-term insomnia disorder (ICSD-3)

Diagnostic Criteria
Criteria A-E must be met
A. The patient reports, or the patient's parent or caregiver observes, one or more of the following:
1. Difficulty initiating sleep.
2. Difficulty maintaining sleep.
3. Waking up earlier than desired.
4. Resistance to going to bed on appropriate schedule.
5. Difficulty sleeping without parent or caregiver intervention.
B. The patient reports, or the patient's parent or caregiver observes, one or more of the following related to the night-time sleep difficulty:
1. Fatigue/malaise.
2. Attention, concentration or memory impairment.
3. Impaired social, family, vocational or academic performance.
4. Mood disturbance/irritability.
5. Daytime sleepiness.
6. Behavioral problems (*e.g.,* hyperactivity, impulsivity, aggression).
7. Reduced motivation/energy/initiative.
8. Proneness for errors/accidents.
9. Concerns about or dissatisfaction with sleep.
C. The reported sleep/wake complaints cannot be explained purely by inadequate opportunity (i.e., enough time is allotted for sleep) or inadequate circumstances (i.e., the environment is safe, dark, quiet and comfortable) for sleep.
D. The sleep disturbance and associated daytime symptoms have been present for less than three months.
E. The sleep/wake difficulty is not better explained by another sleep disorder.

Table 3. Insomnia disorder criteria (DSM-V)

Criteria A-H must be met
A. A predominant complaint of dissatisfaction with sleep quantity or quality, associated with one or more of the following symptoms: 1. Difficulty initiating sleep (in children, this may manifest as difficulty initiating sleep without a caregiver intervention). 2. Difficulty maintaining sleep, characterized by frequent awakenings or problems returning to sleep after awakenings (in children, this may manifest as difficulty returning to sleep without a caregiver intervention). 3. Early morning awakening with inability to return to sleep.
B. The sleep disturbance causes clinically significant distress or impairment in social, occupational, educational, academic, behavioral or other important areas of functioning.
C. The sleep difficulty occurs at least three nights per week.
D. The sleep difficulty is present for at least three months.
E. The sleep difficulty occurs despite adequate opportunity for sleep.
F. The insomnia is not better explained by and does not occur exclusively during the course of another sleep disorder (*e.g.*, narcolepsy, a breathing related sleep disorder, a circadian rhythm sleep-wake disorder, parasomnias).
G. The insomnia is not attributable to the psychological effects of a substance (*e.g.*, drug abuse or a medication.)
H. Coexisting mental disorders and medical conditions do not adequately explain the predominant complaint of insomnia.

International Classification of Diseases (ICD-10, Table 4)[22]

The latest edition of the International Classification of Diseases assesses insomnia in a symptomatic definition with no considerations for daytime impairment. It is considered among mental disorders (nonorganic insomnia, ICD-10 F.51.0) and neurological conditions (disorder of initiating sleep and maintaining sleep – insomnia, ICD-10 G.47.0). According to the World Health Organization, the next revision of this classification is due in 2017.

Table 4. Nonorganic insomnia (ICD-10)

A. A complaint of difficulty falling asleep, maintaining sleep or non-refreshing sleep.
B. The sleep disturbance occurs at least three times per week for at least one month.
C. The sleep disturbance results in marked personal distress or interference with personal functioning in daily living.
D. Absence of any known causative organic factor, such as a neurological or other medical condition, psychoactive substance use disorder or a medication.

HOW TO DIAGNOSE INSOMNIA

Insomnia diagnosis is based on clinical features provided by complete medical history, assessment of subjective sleep parameters, comprehensive physical examination and application of current classifications criteria (ICSD-3 and DSM-V) rather than relying on laboratory or polysomnographic findings. Considering the ethiopathogenics, this sleep disorder can be biological, environmental, behavioral or psychological in nature. Therefore, it is important to perform a systematic search for predisposing and perpetuating factors, such as stress, clinical and mental conditions (Table 5), inadequate sleep hygiene, use of substances/medications (caffeine, alcohol or drugs), circadian unsuitability ("jet lag", shift work), sleep rumination, family history of insomnia or other sleep disturbance.[9,13,23]

Systematic sleep history helps to assess sleep-wake patterns over a period of weeks or months; characterization of the premorbid baseline sleep patterns helps to establish a clinical relevance for insomnia complaints. Questions concerning chronotype and nocturnal sleep characteristics (*e.g.*, sleep latency after lights out, occurrence and number of nocturnal awake during the night, rough time awake after sleep onset and what time the patient gets out of bed) are relevant to establish whether insomnia symptoms are present. The presence of mood changes, irritability, poor memory, fatigue, drowsiness, lack of energy, general malaise and work or social impairment display the occurrence of daytime dysfunction. When related with insomnia complaints, the diagnosis of insomnia disorder is supported. Complete medical history is necessary to help identify medical and mental conditions that can be the source or a secondary effect of this sleep disorder.[13,23,24]

Although it is not mandatory for insomnia diagnosis, instruments can be used to help identify other comorbidities, measure severity of sleep complaints and as a comparison tool for treatment response. For example, the Insomnia Severity Index (ISI) is a subjective scale that assesses the intensity of insomnia symptoms. It has proven valuable for the diagnosis of this sleep disorder.[25] The ISI contains seven questions, each one scoring a value between 0 and 4 points, and the summation gives a total score ranging from 0 to 28. When the sum is higher than 14, clinical insomnia can be defined with great specificity.[26] Assessment of sleep quality and daytime sleepiness is possible by using the Pittsburgh Sleep Quality Index and Epworth Sleepiness Scale, respectively. There are many questionnaires that can assess depression and anxiety symptoms, such as Beck Depression Inventory and Beck Anxiety Inventory, among others.

Table 5. Comorbid clinical and mental conditions of insomnia (adapted from Schutte-Rodin *et al.*, 2008)[24]

Neurological: Stroke, dementia, Parkinson's disease, seizure disorders, headache disorders, traumatic brain injury, peripheral neuropathy, chronic pain disorders, neuromuscular disorders
Cardiovascular: Angina, congestive heart failure, dyspnoea, dysrhythmias
Pulmonary: COPD, emphysema, asthma, laryngospasm
Digestive: Reflux, peptic ulcer disease, cholelithiasis, colitis, irritable bowel syndrome
Genitourinary: Incontinence, benign prostatic hypertrophy, nocturia, enuresis, interstitial cystitis
Endocrine: Hypothyroidism, hyperthyroidism, *diabetes mellitus*
Musculoeskeletal: Rheumatoid arthritis, osteoarthritis, fibromyalgia, Sjögren syndrome, kyphosis
Reproductive: Pregnancy, menopause, menstrual cycle variations
Sleep disorders: Obstructive sleep apnea, central sleep apnea, restless leg syndrome, periodic limb movement disorder, circadian rhythm sleep disorders, parasomnias, bruxism
Mental: Depression, anxiety, psychotic disorders, attention deficit disorder, personality disorder
Substance use/abuse/withdrawal: Anxiolytics and antidepressants: SSRIs (fluoxetine, paroxetine, sertraline, citalopram, escitalopram, fluvoxamine), venlafaxine, duloxetine, monoamine oxidase inhibitors Stimulants: Caffeine, methylphenidate, amphetamine derivatives, ephedrine and derivatives, cocaine Descongestants: Pseudoephedrine, phenylephrine, phenylpropanolamine Narcotic: Oxycodone, codeine, propoxyphene Cardiovascular: β-Blockers, α-receptor agonists and antagonists, diuretics, lipid-lowering agents Pulmonary: Theophylline, albuterol Alcohol
Other: Allergies, rhinitis, sinusites

Quality of life is frequently impaired in these patients, and surveys that assess this parameter are very interesting, especially for treatment evaluation.[24]

Patients with insomnia disorder are dissatisfied with sleep quantity or quality. This generally leads to overestimation of their sleep difficulty and underestimation of actual sleep time, which can also lead to anticipatory anxiety and fear of not sleeping at all. For better elucidation of actual sleep pattern, a sleep log prior to and during treatment must be considered. It is a descriptive subjective report of sleep, evaluating bedtime, sleep latency, number of awakenings, time awake after sleep onset, time in bed, total sleep time, sleep efficiency, nap times and medication use.[24] There is a modest correlation between sleep logs and objective measures, with a tendency to underestimate total sleep time and overestimate sleep latency. Nevertheless, it is still useful as an indicator of the patient's sleep perception.[15] If for some reason these individuals show difficulty completing the sleep log or great sleep misperception, actigraphy can be used as an objective measure.[23,24]

Polysomnography is not routinely indicated for insomnia diagnosis, except when there is suspicion of other sleep disorders, such as sleep apnea, periodic limb movement disorder and restless leg syndrome or former paradoxical insomnia.[23,24] However, recent data suggest that insomniacs with objective hyperalert state might have a more severe insomnia phenotype, with a more chronic and progressive course. This could become a prognostic biomarker for clinical decision-making and therefore define a formal indication for standard sleep study in these patients.[7] Nevertheless, there are not enough data to support routine polysomnography in patients with insomnia.

CONCLUSION

Insomnia is a clinical condition that presents as persistent difficulty in sleep initiation or sleep maintenance or not feeling refreshed upon waking, with impaired social or occupational functioning. It is a prevalent sleep disorder in general population and may lead to serious repercussions to personal and social health. Current classifications (ICSD-3 and DSM-V) are highly similar and lessen confusion regarding insomnia definition, facilitating comparison of insomnia outcomes in future research endeavours. Special attention must be given for those insomniacs with hyperaroused state, who present more severe cardiovascular and neuropsychiatric outcomes, therefore requiring closer assessment.

PARTICIPATION

Philippe Joaquim Oliveira Menezes Macêdo – text writing; Gisele S. M. Leite Neves – review and text writing; Dalva Lucia Rollemberg Poyares – outline reappraisal and text writing; Marleide da Mota Gomes – objective proposal and outline.

Conflict of interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

REFERENCES

1. Seicean S, Neuhauser D, Strohl K, Redline S. An exploration of differences in sleep characteristics between Mexico-born US immigrants and other Americans to address the Hispanic Paradox. Sleep. 2011;34(8):1021-31.
2. Santos-Silva R, Castro LS, Taddei JA, Tufik S, Bittencourt LRA. Sleep disorders and demand for medical services: evidence from a population-based longitudinal study. PLoS One. 2012;7(2):e30085.
3. Daley M, Morin CM, LeBlanc M, Grégoire JP, Savard J. The economic burden of insomnia: direct and indirect costs for individuals with insomnia syndrome, insomnia symptoms, and good sleepers. Sleep. 2009;32(1):55-64.
4. Daley M, Morin CM, LeBlanc M, Grégoire JP, Savard J, Baillargeon L. Insomnia and its relationship to health-care utilization, work absenteeism, productivity and accidents. Sleep Med. 2009;10(4):427-38.
5. Jansson C, Alexanderson K, Kecklund G, Åkerstedt T. Clinically diagnosed insomnia and risk of all-cause and diagnosis-specific sickness absence: a nationwide Swedish prospective cohort study. Scand J Public Health. 2013;41(7):712-21.
6. Singareddy R, Vgontzas AN, Fernandez-Mendoza J, et al. Risk factors for incident chronic insomnia: a general population prospective study. Sleep Med. 2012;13(4):346-53.
7. Vgontzas AN, Fernandez-Mendoza J. Objective measures are useful in subtyping chronic insomnia. Sleep. 2013;36(8):1125-6.
8. Edinger JD, Means MK, Krystal AD. Does physiological hyperarousal enhance error rates among insomnia sufferers? Sleep. 2013;36(8):1179-86.
9. Neves GSML, Giorelli AS, Florido P, Gomes MM. Transtornos do sono: visão geral. Rev Bras Neurol. 2013;49(2):57-71.
10. International Classification of Sleep Disorders – Third Edition. Darien, IL: American Academy of Sleep Medicine, 2014.
11. Ohayon MM. Epidemiology of insomnia: what we know and what we still need to learn. Sleep Med Rev. 2002;6(2):97-111.
12. Ohayon MM, Reynolds CF 3rd. Epidemiological and clinical relevance of insomnia diagnosis algorithms according to the DSM-IV and the International Classification of Sleep Disorders (ICSD). Sleep Med. 2009;10(9):952-60.
13. Pinto Jr LR, Alves RC, Caixeta E, et al. New guidelines for diagnosis and treatment of insomnia. Arq Neuropsiquiatr. 2010;68(4):666-75.
14. Castro LS, Poyares D, Leger D, Bittencourt L, Tufik S. Objective prevalence of insomnia in the São Paulo, Brazil epidemiologic sleep study. Ann Neurol. 2013;74(4):537-46.
15. Summers MO, Crisostomo MI, Stepanski EJ. Recent developments in the classification, evaluation, and treatment of insomnia. Chest. 2006;130(1):276-86.
16. Lian Y, Xiao J, Liu Y, et al. Associations between insomnia, sleep duration and poor work ability. J Psychosom Res. 2015;78(1):45-51.
17. Laugsand LE, Strand LB, Vatten LJ, Janszky I, Bjørngaard JH. Insomnia symptoms and risk for unintentional fatal injuries – the HUNT Study. Sleep. 2014;37(11):1777-86.
18. Quinhones MS, Gomes MM. Sono no envelhecimento normal e patológico: aspectos clínicos e fisiopatológicos. Rev Bras Neurol. 2011;47(1):31-42.
19. Ishak WW, Bagot K, Thomas S, et al. Quality of life in patients suffering from insomnia. Innov Clin Neurosci. 2012;9(10):13-26.
20. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition. Arlington: American Psychiatric Association, 2013.
21. American Psychiatric Association. Highlights of Changes from DSM-IV-TR to DSM-5. Arlington: American Psychiatric Association, 2013.
22. World Health Organization. The ICD-10 classification of mental and behavioural disorders: diagnostic criteria for research. Geneva: World Health Organization, 1993.
23. Cunnington D, Junge MF, Fernando AT. Insomnia: prevalence, consequences and effective treatment. Med J Aust. 2013;199(8):S36-40.
24. Schutte-Rodin S, Broch L, Buysse D, Dorsey C, Sateia M. Clinical guideline for the evaluation and management of chronic insomnia in adults. J Clin Sleep Med. 2008;4(5):487-504.
25. Bastien CH, Vallières A, Morin CM. Validation of the Insomnia Severity Index as an outcome measure for insomnia research. Sleep Med. 2001;2(4):297-307.
26. Alsaadi SM, McAuley JH, Hush JM, et al. Detecting insomnia in patients with low back pain: accuracy of four self-report sleep measures. BMC Musculoskelet Disord. 2013;14:196.